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Self-Addressable Self-Assembling Microelectronic Systems and Devices For Molecular Biological Analysis and Diagnostrics Abstract

A self-addressable, self-assembling microelectronic device is designed and fabricated to actively carry out and control multi-step and multiplex molecular biological reactions in microscopic formats. These reactions include nucleic acid hybridization, antibody/antigen reaction, diagnostics, and biopolymer synthesis. The device can be 10 fabricated using both microlithographic and The device can electronically machining techniques. control the transport and attachment of specific binding entities to specific micro-locations. The specific binding entities include molecular biological molecules such as nucleic acids and polypeptides. The device can subsequently control the transport and reaction of analytes or reactants at the addressed specific microlocations. The device is able to concentrate analytes and reactants, remove non-specifically bound hybridization provide stringency control for DNA reactions, and improve the detection of analytes. device can be electronically replicated.